Budget Briefing to the Presidential Advisory Committee on High Performance Computing and Communications, Information Technology, and the Next Generation Internet

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Human Centered Systems (HuCS)

HuCS FY 1998 Budget by Agency and Program Activity (1)

Total Dollars	**281.12**
DARPA	**137.87**
Microsystems	17.90
System Environments	2.00
Defense Technology Integration and Infrastructure	26.20
Information Sciences	13.01
Intelligent Systems and Software	78.76
NSF	**60.17**
Applications	10.10
Human Centered Systems	50.07
DOE	**9.94**
National Collaboratory Research	3.94
DOE2000 NC	6.00
NASA	**2.20**
Systems Software	1.90
BRHR	0.30
NIH	**29.28**
NLM Biotechnology Informatics	0.69
NLM Electronic Imaging	2.25
NLM IAIMS grants	0.90
NLM Intelligent Agent DB searching	3.33
NLM HPCC Health Care Applications	9.41
NCRR Biomolecular Computing	0.80
NCRR Modeling/Simulation	0.70
NCRR Virtual Reality/Environments	9.70
DCRT High Performance Biomedical Computing Program	0.50
NCI Frederick Biomedical Supercomputing Center	0.28
NCI High Speed Networking and Distributed Conferencing	0.34
NCI High Perf. Comms for PDQ, CancerNet, and Electronic Publishing	0.38

HuCS FY 1998 Budget by Agency and Program Activity (2)

NIST	**13.66**
Information Technology Metrology, Testing and Applications	3.00
Systems Integration for Manufacturing Applications	10.66
VA	**9.20**
Computerized Patient Record and Telemedicine	3.00
Clinical Workstations and Medical Imaging	0.65
Improve Telecommunications Infrastructure and Internet Connectivity	1.30
VA Hybrid Open Systems Technology (VA HOST)	3.25
VA/DoD Sharing	1.00
ED	**12.00**
Regional Education Laboratory Program	2.00
Regional Technology in Education Consortia	10.00
NOAA	**0.50**
Information Dissemination Pilots	0.50
EPA	**0.80**
Public Data Access	0.80
AHCPR	**5.50**
Computer-Based Patient Records	5.50

Budget Milestones

- Demonstrate translingual search aids for military type documents in English, Korean, and a European language; electronic document management with access controls; statistical co-occurrence techniques for texture classification of images; and semi-automatic generation of metadata
- Demonstrate order of magnitude improvement in operating systems/ network interface of translucent system and LAN-based quality-of-service performance assurance for Quorum Prototype No.1
- Demonstrate initial capabilities of intelligent information services architecture with multiple mechanisms for describing resource capabilities and with a uniform interface to hybrid search methods for resource retrieval
- Demonstrate symbolic simulation linked with hardware emulation for complex design technology
- Demonstrate a reduction by a factor of five in early design trade-off time by combining qualitative and quantitative models

Budget Milestones (2)

- Complete the experimental evaluation of design technology for high performance computational prototyping of systems, supporting both task and data parallelism for scalable software library technology
- Demonstrate the results of mature Digital Library Technology projects
- Demonstrate the languages and runtime services in defense applications, and complete the scalable software library technology demonstration
- Demonstrate feasibility of utilizing an advanced software environment that supports composition tools for composing software, integration, and software development and testing using animation techniques in military environment
- Complete standardized readings of National Health and Nutrition Examination Survey (NHANES) II and III images and begin general access to integrated database consisting of NHANES II and III text and images as a beta test
- Demonstrate collaboratory environment use by government and industry partners in development and validation of manufacturing integration specifications

Assessing Progress

- Agency evaluation (e.g., GPRA)
- Multi-agency evaluation of joint programs
  - PI meetings; professional conferences; publications
  - Regular progress reports to management
  - Joint-agency site visits
  - Periodic evaluation by outside groups
  - Successive follow-on programs
- Evidence of industrial participation

Setting the HuCS R&D Agenda

- Cognizant of agency-specific agenda
- Criteria for joint-agency programs
  - Common interest
  - Complementary in portfolio; expertise; coverage
  - Ease in resources matching for maximal leverage
  - Need and readiness to push the frontiers of knowledge
- Process for collective agenda
  - Joint-agency planning meetings
  - Joint-agency planning workshops; reports
  - Resource identification
  - Development of joint programs (resources; people; community input) by interagency working teams

Private Sector Roles

- Investment in low-risk R&D portfolio
- Hardening of known and proven technologies for product development
- Partnering with academic research for gaining first-hand knowledge in high-risk and long-term work
- Providing feedback in the research-product cycle

Agency Roles

- Assessing the frontiers of knowledge and technology
- Meeting mission requirements
- Identifying gaps and new opportunities in R&D portfolio across agencies
- Rigorous investment in high-risk areas to help reduce uncertainty
- Monitoring shifts and managing changing needs in human resources
- Maintaining healthy balance between competition and collaboration among agencies

Multiagency Work: Some Highlights

- Joint programs
  - Digital libraries initiatives
    - Phase 1 (1994 - 1998): NSF, DARPA, NASA
    - Phase 2 (1998 - 2003): NSF, DARPA, NASA, NLM, LOC
  - STIMULATE (Speech, Text, Image, MULtimedia Advanced Technology Effort, 1996 - 1998): NSF, DARPA, NSA, CIA
  - Multi-Lingual Information Access Initiative (In Progress)
  - Universal access: Every-citizen interfaces to the Nation's information infrastructure (in progress)
- Program Coordination
  - Collaboration technology: DARPA, DOE
  - Text understanding/summarization program: DARPA, NSA, NIST

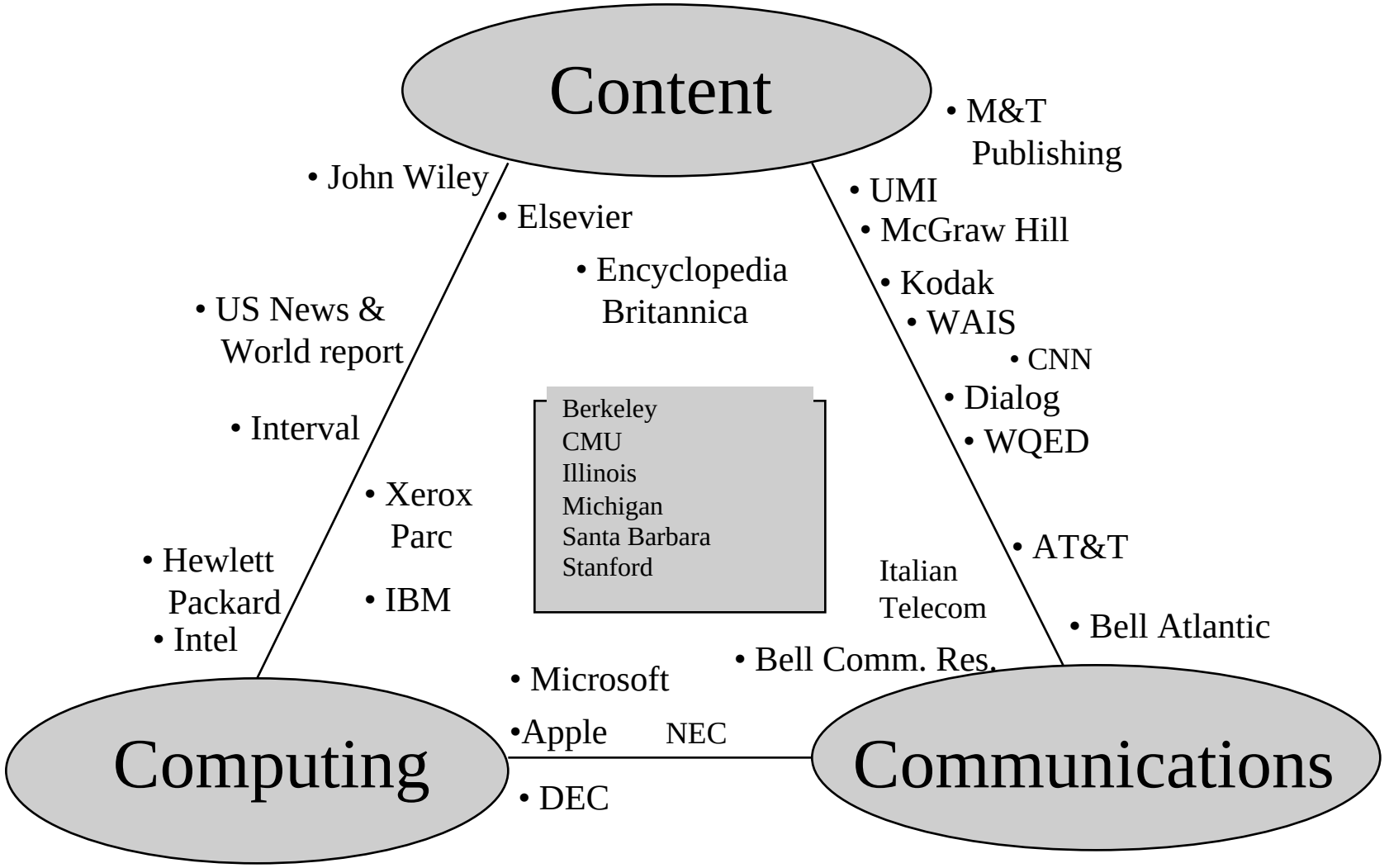
Digital Libraries: 1994 - 1998

An NSF/DARPA/NASA Joint Research Initiative

- CMU Informedia: Integrating speech, text, and image processing technologies for digital video
- UC Berkeley: Multiplicity of information structures
- U Michigan: Intelligent agents and collaboration technologies
- UC Santa Barbara: User-centered spatial information systems
- Stanford InfoBus: Heterogeneity and interoperation
- U Illinois: Scaling digital repositories across knowledge domains

DLI Projects and Partners

A Joint Agency Research Initiative



STIMULATE: An Inter-agency Initiative

Research In Progress

- Search over live multimedia database
- Multi-modal indexing, retrieval, and browsing
- Generalized example-based machine translation
- Multimodal conversational behaviors in interactive environment
- Tools for lexicon building
- Multimodal communication in collaborative environments
- New framework for speech understanding
- Human-computer collaboration
- Multi-media access to spatial data
- New language models for Conversational speech recognition
- Generating coherent summaries of on-line documents
- Modeling structures for spontaneous Speech recognition
- Gesture, speech, and gaze in discourse management
- Labeling of hidden work-level events in speech
- Integrating audio and video information for scene segmentation

Issue of Overlap

- Complementary in strengths: resources, expertise, constituencies, coverage (+)
- Sharing in risk, cost of initial investment, results of research (+)
- Increased complexity in planning, execution, portfolio management (+ & -)

Major HuCS Concerns

- Lack of budget authority over agencies
- Limited people resources
- Hidden management cost not recognized anywhere in the budget process
- Weak representation and participation by critical mission agencies with limited R&D budgets and responsibilities